STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
Honolulu, Hawaii 96813

January 26, 2007

Chairperson and Members
Board of Land and Natural Resources
State of Hawaii
Honolulu, Hawaii

Land Board Members:

SUBJECT: ANNUAL UPDATE ON CHEVRON HAWAII REFINERY SAFE HARBOR AGREEMENT

The Board of Land and Natural Resources approved the Safe Harbor Agreement for the Chevron Hawaii Refinery on Oahu on June 24, 2005. At that meeting, a representative from the Federal Aviation Administration raised a concern that managing ponds at the refinery to maximize nesting habitat for Hawaiian Stilt may increase the risk of airplane strikes. After approving the agreement, the Board requested that DOFAW annually report on whether the actions implemented under the Agreement have increased the risk to the flying public.

Chevron has now submitted an annual report (attached) for the first full year of the Safe Harbor Agreement. The numbers of stilts observed at the refinery during the first full year of the Safe Harbor Agreement fall within the same range as had been observed there during the previous 5 years. The monthly average number of stilts seen at the refinery during the past year ranged from 11 in September to 67 in April. During the previous 5 years, the monthly average number of stilts seen at the refinery ranged from 5 in October 2003 to 128 in April 2001. During 2006, the highest number of stilts seen at the refinery was 80. During the previous 5 years, the highest number observed was 142 (in April 2001).

Therefore, there does not appear to be any increase in the risk to aviation safety due to actions implemented under the Agreement. DOFAW and the U.S. Fish and Wildlife Service will continue to work with Chevron to monitor the population and respond to any safety risk that may result from the habitat management efforts being implemented there.

Respectfully submitted,

Paul J Conry

PAUL J. CONRY
Administrator

Attachment I

APPROVED FOR SUBMITTAL:

PETER T. YOUNG, Chairperson
Board of Land and Natural Resources

Chevron Hawaii Refinery Safe Harbor Agreement

Report of 2006 Hawaiian Stilt and Hawaiian Coot Monitoring
January 1, 2006 to October 31, 2006

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Abstract

This report summarizes the monitoring data from the 2006 ae'o or Hawaiian stilt (*Himantopus mexicanus knudseni*) and 'alae ke'oke'o or Hawaiian coot (*Fulica alai*) non- and breeding at the Chevron Hawaii Refinery (Chevron). The data collected included breeding activity, management activities (e.g., vegetation, water, and predator control), deterrent methods, mortality and incidental take, along with recommendations for future adaptive management techniques. A total of 8 stilts and 0 coots fledged in 2006, with much of the mortality attributable to depredation. In another event, two adult stilts and three chicks also died when the birds were unable to egress from a partially netted pond after the pond water had evaporated.

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Introduction

Background

Since 1992, the Chevron Hawai'i Refinery (Chevron) and the U.S. Fish and Wildlife Service (USUSFWS) have been working together to implement proactive conservation activities to benefit the endangered ae'o or Hawaiian stilt (*Himantopus mexicanus knudseni*). Chevron is located within Campbell Industrial Park, Kapolei, O'ahu (Appendix E). Chevron has managed Rowland's Pond, as temporary nesting habitat for stilts during its breeding season (Mid-February through August) by conducting vegetation and water level management, net maintenance over several refinery ponds, and predator control activities. During the stilt breeding and non-breeding season, the USFWS conducted biological monitoring of stilts and other migratory bird species and provided technical assistance to Chevron for water bird management at the refinery ponds.

Hawaiian stilts, the endangered 'ale ke'o ke'o or Hawaiian coot (*Fulica alai*), which first appeared at Chevron in 1997, and several species of migratory shorebirds have used Chevron's ponds for nesting and/or foraging. These ponds include Rowland's Pond, the Oxidation Ponds, Impounding Basin, and the North and South Ocean Ponds. Rowland's Pond, a 6-acre area, is primarily used by Chevron as a catchment for products released from ruptured tanks and a containment area for storm water runoff and non-hazardous sludge from Chevron's wastewater treatment plant. During the stilt breeding season, Chevron pumps water into Rowland's Pond and manages the water level for stilt nesting and foraging habitat (i.e., mudflat, shallow, and open water habitat). The Oxidation Ponds and Impounding Basin are part of the wastewater treatment facility (approximately 5 acres). The North and South Ocean Ponds are open-water ponds that function as temporary containment areas for storm water runoff that occasionally includes spilled oil. Chevron cleaned and constructed nets over these ponds in 1992 as they were an attractive nuisance to migratory shorebirds and endangered waterbirds.

In November 7th, 2005, Chevron Hawaii Refinery entered Safe Harbor Agreement (SHA) to provide safe nesting and foraging habitat for Hawaiian stilts and foraging habitat for Hawaiian coots. This annual monitoring report is part of the SHA requirements, and covers the 2006 Hawaiian stilt and Hawaiian coot non-breeding and breeding season at Chevron Hawai'i Refinery. Information on Hawaiian stilt and Hawaiian coot breeding activity, management activities conducted at Chevron's Ponds, stilt mortality and incidental take, occurrence of migratory birds at the Chevron's Ponds, bird activity during the non-breeding season, and recommendations for future management are also included.

Objective and Scope

The objective of the waterbird monitoring is to determine nesting success of Hawaiian Stilt and Coot, to evaluate habitat conditions and the response of these waterbirds to habitat management, and to assess effectiveness of predator control management.

Methods

Monitoring Activities

Site Visits

During the 28-week stilt and coot breeding season, site visits were conducted once a week from March 8, 2006 through August 31, 2006, and once a month during the remaining months of the calendar year. Data recorded include the location of stilt and coot nests, the number of stilt and coot eggs, chicks, and fledglings, color band combinations of banded stilts, evidence of predation upon eggs or chicks, the number of unhatched eggs collected, and water level at Rowland's Pond. Most of the monitoring was conducted shortly after sunrise when the birds, especially the young stilt chicks are most active, and when cooler temperatures minimize the effects of exposure as a result of potential disturbance.

Bird monitoring

When possible, monitoring was carried out from a distance using binoculars, or a high-powered spotting scope. A car was used as a blind, and most observations at Rowland's Pond were made from the top of tank 110, when conditions allowed safe use of that area. The pond was entered only when necessary observations of breeding success were not possible from a distance.

Other bird species and their observed numbers at each pond were also recorded. From 1992 through 2000, USFWS conducted site visits two to three times per week. Since then, monitoring efforts were reduced to once a week due to the availability of Service personnel. In 2005, Chevron hired a biologist who was trained and supervised by USFWS and Chevron. Monitoring and data collection for the 2006 season was carried out by Jaap Eijzenga except between May 5th and August 4th, 2006, when subcontractor Christine Volinski, assisted by Ron Walker, performed the weekly visits. Weekly visits were maintained to reduce the amount of exposure and interference to the nesting stilts and coots at the refinery.

Management Activities

Vegetation Management

Vegetation management at Rowland's Pond included manual removal and mechanical removal, and herbicide treatment. Vegetation was managed at Rowland's Pond to reduce the amount of available vegetative cover for predators, increase water surface area for foraging, and increase amount of mudflat habitat for nesting.

At the Impounding Basin and Oxidation Ponds, vegetation management is intended to reduce the amount of vegetation available for ducks to build nests. Vegetation was cleared manually and mechanically from the periphery and berms of the Oxidation Ponds and Impounding Basins in February, prior to the beginning of the stilt breeding season.

Water Management

To prepare Rowland's Pond for the stilt breeding season, water was pulsed into the pond in early February, following vegetation management activities. This water input sustains an invertebrate prey base for nesting adults and future young. During the breeding season, water levels in Rowland's Pond were recorded during each site visit and managed specifically to support nesting and foraging stilts. Management of the water level was based upon the number of visible mudflat areas suitable for nesting sites.

Rowland's Pond was kept dry during the stilt non-breeding season to encourage stilt dispersal to natural wetlands on Oahu or outer islands. Although water was not pumped into Rowland's Pond during the stilt non-breeding season, pockets of standing water occurred in the pond following heavy rain events.

Predator Control

USDA, Animal and Plant Health Inspection Service, Wildlife Services (WS) conducted year-round predator control for cats, (*Felis cattus*) Indian mongoose, (*Herpestes javanicus*, syn. *H. auropunctatus*) and Polynesian rat, (*Rattus exulans).* Data from January 1st to October 31st are included in this report. A total of twenty live traps baited with cat food were employed, of which eight were placed around Rowland's Pond, and twelve along the fence line from the IAF Pond down the length of the Impounding Basin and Land Farm (Appendix A). WS checked all traps every other day, removed all predators caught in the traps, and recorded the number, species, sex, location of each predator caught, and type of bait used each month.

Deterrent Methods Used to Haze Birds from the Oxidation Ponds and Impounding Basin

No deterrent methods were implemented during the 2005 stilt breeding season

Hawaiian Stilt and Hawaiian Coot Mortality and Incidental Take

Any mortality or injury to Hawaiian silts, Hawaiian coots, or other migratory birds at Chevron's Ponds are reported to USFWS. Depending upon the incident, appropriate action is taken (e.g., cleaning and rehabilitating an oiled bird, collecting deceased bird and if possible submitting the specimen for necropsy to determine cause of death). Stilt eggs are collected based on evidence of predation or unhatched eggs that are approximately 14 days beyond their expected hatch date. The incubation period for stilts is approximately 23-26 days from when the first egg is laid. Eggs are collected to minimize attracting predators to the site and minimizing potential predation upon other stilt nests. Collected eggs are submitted to USFWS whom then submits the specimens to the National Wildlife Research Health Center in the Federal Building for necropsy to provide information on unhatched eggs.

Results

Hawaiian Stilts

Through and water level management, stilts are encouraged to utilize Rowland's Pond during the breeding season and find other foraging areas during the non-breeding season. This management is reflected in the total number of stilts at the refinery (fig. 1). Stilts occupied Rowland's Pond between the middle of February through August. At the beginning of the calendar year 35 stilts were loafing and foraging around the Impounding Basin. The highest number of stilts observed at Rowlands Pond was 62, and the highest number on the entire refinery was 74 on April 20th.

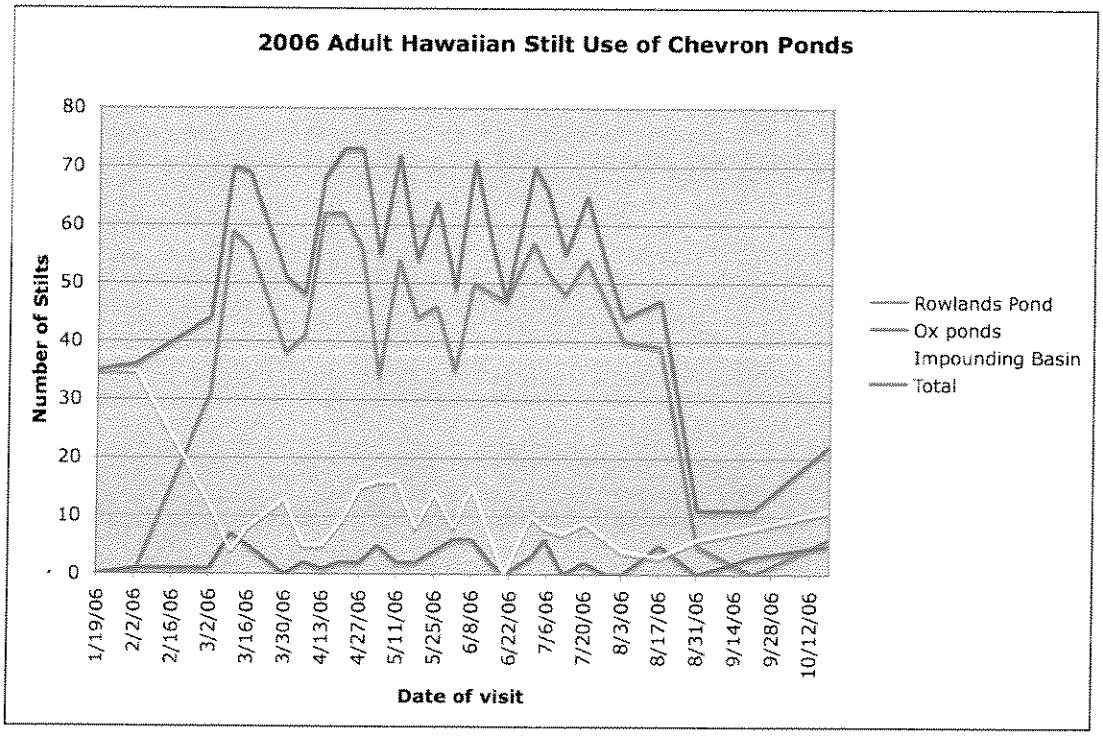

Figure 1: Use of Chevron ponds by adult Hawaiian stilts in 2006.

A total of 25 nests were found at the refinery throughout the breeding season. The first nests were found on April 13th, in Rowland's Pond where most of the nesting occurred. One nest was found on a sludge island at ox pond 2, and eight nests were found at the impounding basin. Since visits were made once per week, the fate of many nests is unknown. The most reliable index for nesting success at the refinery is fledging success. For the 2006 breeding season, fledging success is estimated at 0.3 fledged chicks per nest, or 8.9% (percentage of eggs that lice to fledging stage. Peak egg-laying was between April 13th and May 4th, and peak hatching was between May 4th and June 8th (Fig.2)

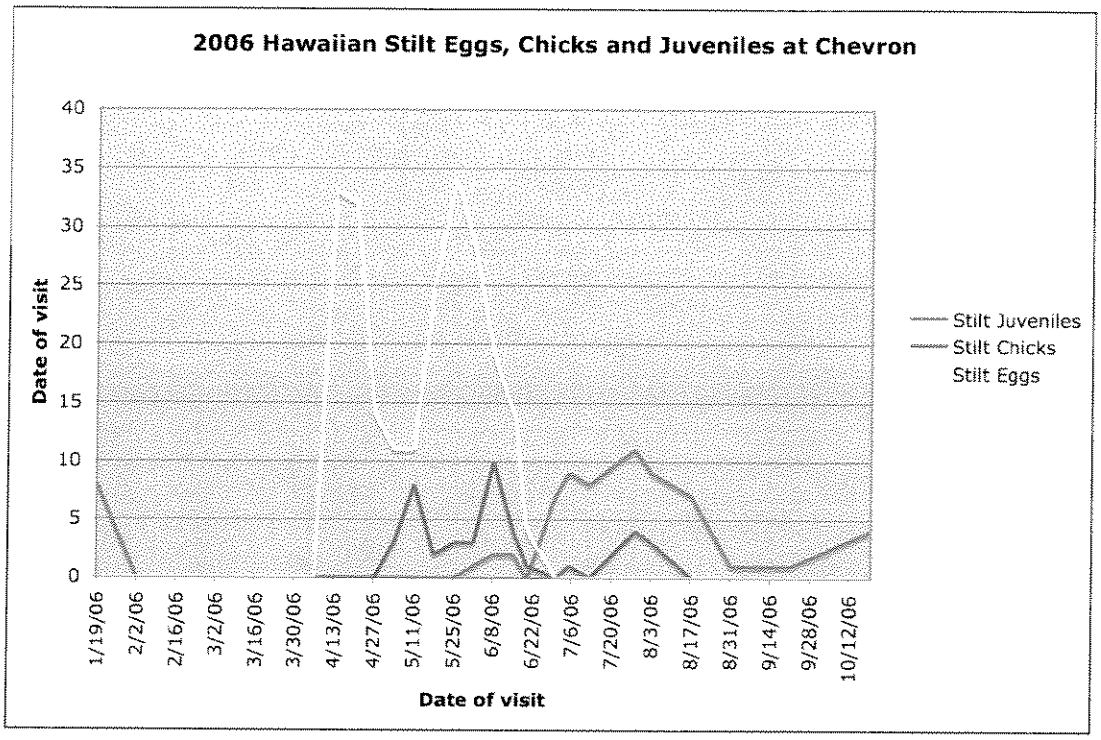

Figure 2: Nesting Phenology of Hawaiian Stilts at Chevron Hawaii refinery

Nesting success was very low in the 2006 breeding season. On April 27th most of the existing nests had been depredated by mammalian predators, as well as avian predators. This continued to be a problem throughout the season (figure 3). The exact predator is often difficult to determine due to various factors such as tracks being washed away by rainfall, lack of remains, or nests located on substrate in which tracks are difficult to detect (e.g., concrete, rocky areas). Some eggs had lateral slits, suggesting an avian predator, while some eggs had a cap chewed off, were crushed, or disappeared, suggesting a mammalian predator. A Cattle egret (*Bulbulcus ibis*) was observed at Rowland's Pond during site visits at April 27th and May 4th, coinciding with timing of egg depredation events, and Ruddy turnsones (*Arenaria interpres*) and Mynah's (*Acridotheres tristis*), both known egg predators, are also common in the area. It is unlikely, however, that these two species take eggs that are attended by adult stilts. It is also likely that a number of small chicks were taken by predators as well, as many disappeared within the first two weeks after hatching.

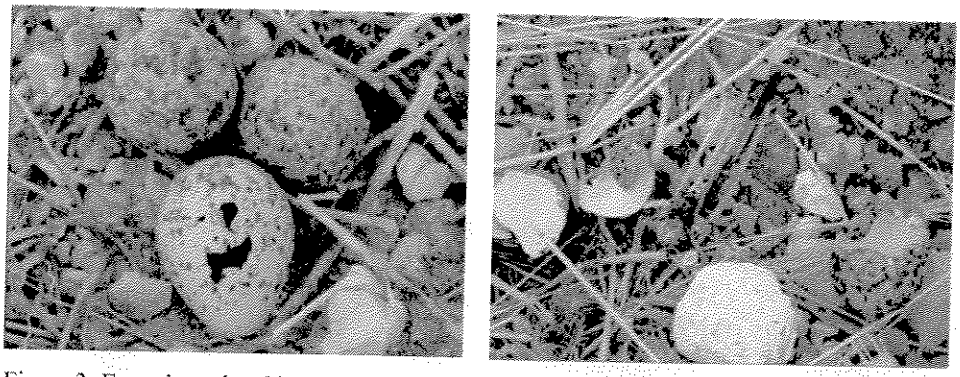

Figure 3: Eggs depredated by avian (left and mammalian (right) predator.

Some banded stilts were observed throughout the season, but identification of the bands proved difficult (figure 4). Birds at Chevron were last banded in the mid-1990's, and most of the re-sightings were of bands too faded for color determination, or of birds who lost one or several of the color bands. The only reliable re-sighting was of a female stilt with combination AG:BR. This bird was banded at Rowland's Pond on 06/13/1994 as a hatchling.

Figure 4: Adult stilt with faded and missing bands

In the week of September 20th, an adult stilt with apparent botulism symptoms was captured in a small pond in Poipu, Kauai. The bird was treated and released by DLNR staff several days later. The bird was banded with aluminum USFWS band (# 664-10931) and two faded color bands. This bird was banded as a hatchling at Rowland's Pond on June 22, 1994. This bird represents one of the few banded birds that illustrates inter island movement of Hawaiian stilts.

Hawaiian Coots

Coots were seen at the Impounding Basin throughout the year, and even at Rowland's Pond between April 6 and April 20. One or two pairs attempted to nest three times on the berm in the impoundment basin, but none of the eggs hatched. In addition to the nests, two eggs were laid on the berm, without nest construction, and these eggs were never incubated. Coot nests were constructed with live and dead vegetation and the occasional plastic bag. In the 2005 season one pair of coots nested throughout the season with repeated failed clutches.

Other bird observations

The following species were regularly observed at the study sites (table 1-5, Appendix B): 'akekeke or Ruddy turnstone (*Arenaria interpres*); hunakai or Sanderling (*Calidris alba*);

kolea or Pacific golden-plover (*Pluvialis fulva*); koloa-mallard hybrids (*Anas platyrhyncos x Anas wyvilliana*), 'ulili or Wandering tattlers (*Heteroscelus* incanus), Cattle egrets (*Bubulcus ibis*) and Northern shovelers (*Anas clypeata*). Most of these species, excluding the duck hybrids and egrets, represent migratory species that show up in Hawaii around September, and leave for their nesting grounds in the sub arctic region in March.

Vegetation in the ponds

Prior to the breeding season Rowland's Pond was manually (weeding-by-hand) and mechanically (weed-eaters and larger equipment) cleared of all vegetation. Despite the heavy rain in March much of Rowland's Pond remained free of vegetation (figure 5), in contrast to last year's overgrown conditions. The dry, east side of the pond was the most vegetated, and was dominated by *Flaveria trinervia*, an invasive plant in the sunflower family (*Asteraceae*) that does well in dry, compacted soils, and on-native grasses. A vegetation list compiled in 2006 can be found in Appendix C.

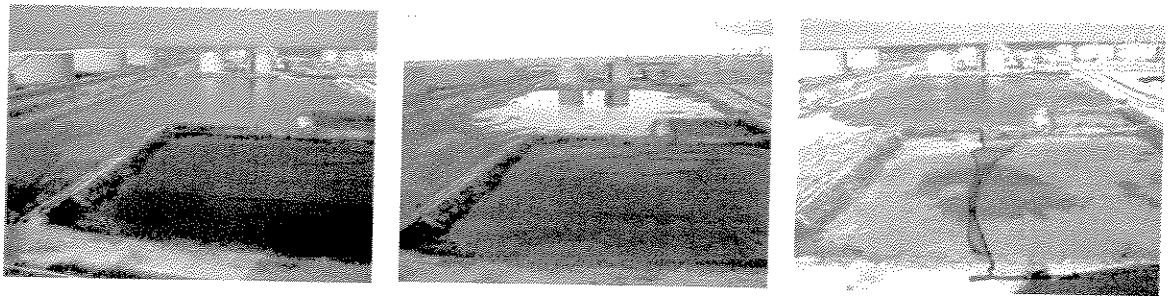

Figure 5: Photographs of Rowland's Pond taken on (from left to right) March 30, April 27 and July 27, 2006 from tank 110, illustrating the vegetation cover throughout the season. Note net repair on far right picture.

Vegetation on the South Berm consisted mostly of the invasive Golden Crown-beard (*Verbesina encelioides*). This weed has the ability to overgrow the dry parts of the pond. During the breeding season, vegetation covered approximately 10 percent of the pond, primarily the east side and perimeter of the pond.

Water level management

Management of the water level in Rowland's Pond was very successful. The Pond filled quickly in February and March due to heavy rains, and one the water level reached about 10" on the gauge (Fig.6), manual pulsing of water into the pond sustained a fairly stable water level throughout the season (Fig.7). Small oscillations are good, and promote hatching of invertebrates, which form an important food source for the stilts. Pumping of water into the pond ceased at the end of August, and because of high evaporation rates at this time the pond dried up quickly.

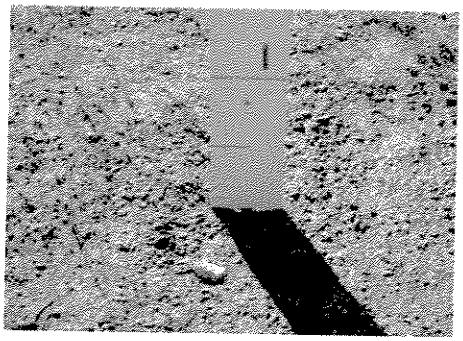

Figure 6: Measuring gauge at Rowland's Pond

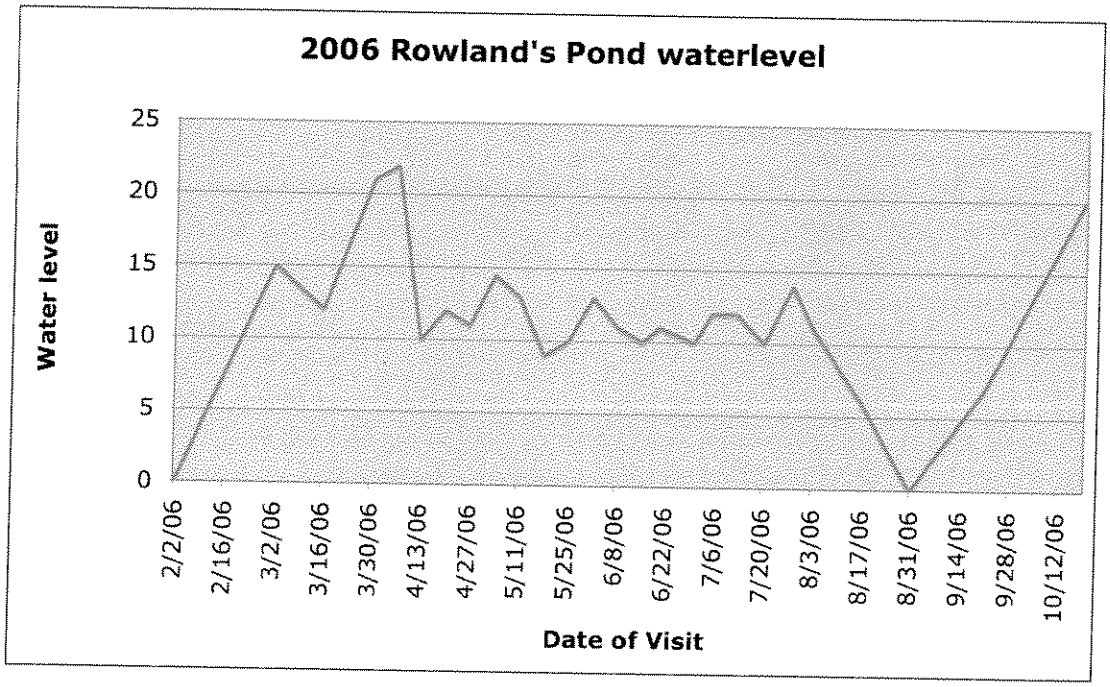

Figure 7: 2006 Water levels at Rowland's Pond, Chevron Hawaii refinery

Predator control

Predator trapping was conducted throughout the monitoring period. A total of 223 mongoose, 40 cats and four Polynesian rats were captured (Appendix A). In addition to the small-mammal live traps, one large dog trap was placed on the west side of the impounding basin after dog activity was reported late 2005. One dog, captured in January, was owned by an employee of the adjacent chemical plant, and was returned to its owner, who received a stern warning. A second dog was removed in July.

Hawaiian Stilt and Hawaiian Coot Mortality and Incidental Take

There was a very high incidence of egg depredation for both species during the 2006 breeding season. No abandoned eggs were collected. A total of four adult, and three

immature stilt carcasses were collected and sent to Dr. Thierry Work at the National Wildlife Health Center (US Geological Survey/Biological Research Discipline) for necropsy (Appendix D).

A severely decomposed stilt carcass was discovered on October 31, 2005, and collected the following day on November 1st. The carcass was much too old do determine the cause of death, but bands were collected from the legs and sent to the USGS Bird Banding Lab. The bird, carrying band number 0664-10944 was banded as a hatchling at Chevron on July 15th, 1994.

During 2006, on May 26th one adult stilt was found dead in the netted area of the square pond adjacent to Rowland's Pond. On June 1st an additional adult stilt and three chicks were found dead in the same area. There was no apparent sign of depredation, and the birds may have starved to death, unable to exit the pond, despite efforts by refinery personnel to create an exit ramp.

Two more dead adult stilts were recovered later in the season on August 7th and September 20th. The cause of death of these birds remains inconclusive, and there was no apparent depredation or contamination. The bird collected in September appeared to have injury to head and neck.

In addition, one owl was sent to at the National Wildlife Health Center for necropsy. This turned out to be a Barn Owl (*Tydo alba*), which is considered an invasive species. Barn owls were introduced in Hawaii in the 1950's to control rodents, but have proven to be a predator of native birds, including endangered species. The species may prey upon native waterbirds and migratory shorebirds.

All necropsies are still pending. Results may be included in the 2007 report.

Discussion and Recommendations

Overall management at the refinery

Rowland's Pond appears to provide suitable nesting habitat for stilts, and may have sufficient food resources for the chicks. Stilts are found in other areas throughout the refinery, including areas where they are undesired, or at greater risk. Some situations are unavoidable, such as stilts prospecting and nesting in flooded areas around the tanks, while in some areas measures can be implemented to deter stilts. A nest was found on a sludge island in Ox Pond 2. The pond, which is generally dredged every three years, had a significant amount of sludge, forming potentially hazardous conditions for the birds. The sludge island may have appeared to be a safe nesting spot. Some areas may provide a good food source for stilts and coots.

Recommendation: The Oxidation Ponds should be dredged sooner than once every three years to control the amount of food source produced that would attract stilts from nesting anywhere other than Rowland's Pond. The new aeration pump that has been installed in

Ox Pond 2 may help deter birds from using the area. The goal is to keep Rowland's Pond the source of nesting and foraging habitat. By keeping all other attractants to a minimum, Chevron will decrease hazardous conditions for the birds, and avoid conflict situations with operations.

A method to deter the birds from the IAF Sludge Pit, Oxidation Ponds, South Ocean and North Ocean Ponds would be to implement hazing tactics. If monitored daily for effectiveness, Mylar tape could be an efficient and low cost deterrent. It is recommended that poles be erected at the corners of each pond of concern and strung with Mylar tape to harass the birds off and away from the ponds. Occasional relocation of the poles might be necessary to keep the birds alert, observation of behavior is key to making this work.

Vegetation Management for Rowland's Pond

Vegetation management should be restricted to the non-breeding season to avoid harassing stilts. The pond is generally dry during the non-breeding season to encourage bird dispersal to natural wetlands.

The early part of the season started out with bare ground due to the harvesting and weeding efforts prior to the breeding season. However, once the rain started, and water was pumped into the pond it was a matter of days before the first shoots of bulrush and grasses started to appear. In 2005 while the pond was mostly covered with vegetation, in 2006, the pond contained mostly barren ground. The dry areas of the pond, however, were overgrown with dense weeds. This scenario resulted in available cover for predators, and little cover for stilt nests and chicks. This may have contributed to the high incidence of depredation.

Recommendation: Some vegetation in the pond is beneficial to stilts and their invertebrate prey. Vegetation around the pond should be controlled prior to the breeding season, and may even be sprayed with Roundup during the breeding season, unless nests are present in the vegetation. The berm is primarily vegetated with the quick-growing annual *Verbesina encelioides*, which should be sprayed once it has started to germinate after heavy rains. A similar treatment may be applied to *Flaveria trinervia*.

Vegetation Management for the Impounding Basin and Oxidation Ponds

Regular maintenance of the Impounding Basin and Oxidation Pond Berms continued regularly unless advised against due to a nest on the berm.

Recommendation: Remove all vegetation along the roads and berms adjacent to the Impounding Basin and Oxidation Ponds to minimize available material for coots and ducks to construct nests. However, once eggs are laid or nests observed, vegetation within a 100-foot radius should not be removed to avoid harassing of the animal. Monitoring biologist should be notified immediately when a nest is found at the Impounding Basin or the Oxidation Ponds. Vegetation around nets should always be controlled to ensure integrity of the nets.

Water Management

The difficulty in managing water in a closed system is predicting when to stop pumping water according to the proximity of nests to the water's edge, rain events, and the evaporation rate which takes into consideration the atmospheric temperature, humidity, and wind speed. Because Chevron relies on evaporation to eliminate water from Rowland's Pond, correcting high water levels due to over pumping is nearly impossible.

Stilt nests were primarily found around the perimeter of the pond, where dry ground was present. Foraging habitat was found primarily at the shallow water edges around the pond. The deep areas of the pond were barely suitable for adult foraging during much of the season, and much too deep for chick foraging. Most nests around the perimeter of the pond became prey to predators, resulting in very low productivity. The entire east side of the pond was dry and overgrown all season, making it unsuitable for nesting and foraging.

Recommendation: To maximize the amount of nesting and chick-rearing habitat in Roland's Pond, I recommend leveling the entire pond, and then pushing dirt onto small piles to create islands. This will increase the amount of shallow feeding habitat, and will decrease depredation problems.

Predator Control

Continual evaluation of the results from the predator control program will ensure the effectiveness of the predator control program. Regular communication between the US Fish and Wildlife Service, Chevron, and Wildlife Services should be kept in order to compare observations and adjust procedures according to conditions existing in the field. Predator control does not appear to adequately address depredation issues this year, and methods should be re-evaluated. An increase in the number of traps may be beneficial, and periodically moving the traps to different locations, and switching the bait are easy ways to increase trapping success by limiting the animals' habituation to the traps.

Increase Awareness of the Hawaiian Stilt and the Chevron Refinery Grounds

To increase the awareness of Chevron employees about the Hawaiian stilts, Hawaiian coots, and migratory bird species that visit the refinery ponds, provide opportunities to educate refinery employees. When refinery operators are informed of stilt and coot behavior, they can notify the Environmental Group and the monitoring biologist and ultimately weigh in on the management response to avoid stilts nesting in non-desirable or hazardous areas of the refinery.

Educated operators/employees can provide additional stilt observations and facilitate data gaps between Service monitoring visits during the breeding season. Observations of stilt behavior and the location of stilts throughout the refinery, help determine overall stilt activities at Chevron.

Maintenance of Nets

Due to the critical nature of several unplanned refinery jobs, manpower to repair the nets is very limited. The nets over the IAF Sludge Pit, South Ocean Pond and North Ocean Pond are under continual wear and tear from the weather and wildlife. It is a regular occurrence for birds (ducks and stilts) to get stuck under the nets, and the stress they undergo can be tremendous depending upon the amount of space or lack thereof they have to move. Their immediate access to a food/water source can play a key role to their reaction to being trapped under a net. By sealing the nets and maintaining them regularly, the birds will be unable to gain entry into the ponds and therefore, reducing the amount of rescue efforts and resources (operators time away from work) in the long run. Regular maintenance of the pond nets would not only be effective, but efficient.

Most of the nets in 2006 were in poor shape (fig. 8). Ducks and stilts were regularly found underneath the nets in South Ocean Pond, and two stilt nests were built underneath the large net covering the square pond adjacent to Rowland's Pond. This situation resulted in the mortality of two adult stilts and three chicks. In addition one duck died after it ended up underneath the small net covering the small square pond adjacent to Rowland's Pond. Adult mortality affects population viability more severely than juvenile mortality. It should therefore be this program's primary goal to ensure adult survival.

Recommendation: The netting situation needs to be re-evaluated. If nets are not required to prevent reduced survival probability of coots, stilts, or migratory birds, they should be removed. Otherwise, nets covering the square ponds adjacent to Rowland's Pond, and the nets covering North and South Ocean Ponds should be replaced before February 2007. Repair of perimeters and seams have proven to be ineffective in maintaining the integrity of the nets, and these nets have been in a general dilapidated state throughout the season. Prior to installation of the new nets, vegetation (Most notably *Pluchea indica* and *P. carolinensis*) needs to be removed from the berms to prevent damage to the nets. If Chevron employees are not available to perform these operations, outsourcing may be considered.

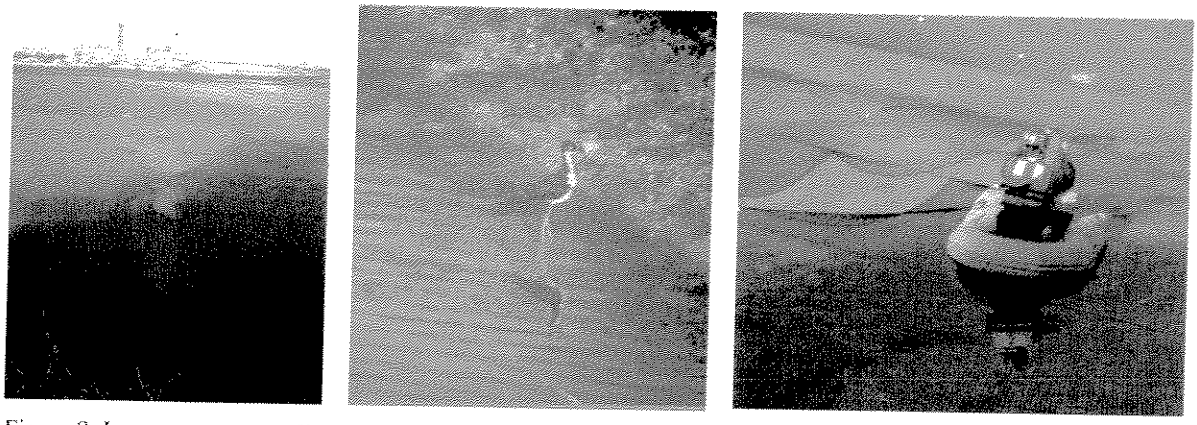

Figure 8: Large square net adjacent to Rowland's Pond in disrepair (left), with stilt in netted pond (center), and repairs made to net in middle of season (right).

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Appendices

Appendix A: Predator control

Month	Cat	Mongoose	Polynesian Rat	Dog
January	6	26	3	1
February	2	25	0	0
March	1	27	0	0
April	6	32	1	0
May	3	26	0	0
June	1	28	0	1
July	2	2	0	0
August	7	18	0	0
September	4	19	0	0
October	8	20	0	0
Total	**40**	**223**	**4**	**1**

Appendix B: Bird observations

	2006 Chevron Hawaii Refinery total counts														
Date of site visit	Hawaiian Stilt	Stilt Juveniles	Stilt Chicks	Stilt Eggs	Hawaiian Coot	Coot Juveniles	Coot Chicks	Mallard/X	Duck chicks	Ruddy Turnstone	Sanderling	Pac. Golden Plover	Wandering Tattler	Cattle Egret	Northern Shoveler
19-Jan	35	8	0	0	4	1	0	21	0	29	19	13	0	0	0
2-Feb	51	0	0	0	5	1	0	18	0	30	13	19	2	0	10
2-Mar	44	0	0	0	7	0	0	19	0	1	6	2	0	0	9
10-Mar	70	0	0	0	6	0	0	17	0	5	33	6	0	0	9
16-Mar	80	0	0	0	6	0	0	12	0	32	87	5	0	0	8
30-Mar	56	0	0	0	6	0	0	10	0	17	7	5	0	0	10
6-Apr	51	0	0	0	5	0	0	9	0	22	48	19	0	0	4
13-Apr	70	0	0	33	4	0	0	14	0	67	31	3	0	0	0
20-Apr	75	0	0	32	6	0	0	21	0	31	0	3	0	0	0
27-Apr	73	0	0	14	4	0	0	16	3	14	2	6	1	1	0
4-May	55	0	3	11	5	0	0	15	0	5	0	0	0	1	0
11-May	72	0	8	11	4	0	0	16	3	8	0	2	0	0	0
18-May	54	0	2	25	3	0	0	14	3	49	0	2	0	0	0
25-May	64	0	3	34	3	0	0	24	3	19	0	0	0	0	0
1-Jun	49	1	3	28	5	0	0	19	3	0	0	0	0	0	0
8-Jun	71	2	10	19	5	0	0	33	2	3	0	0	0	0	0
15-Jun	56	2	4	14	5	0	0	34	2	1	0	1	0	0	0
20-Jun	60	0	1	4	6	0	0	47	0	0	0	0	0	0	0
30-Jun	71	7	0	0	2	0	0	37	0	0	0	0	0	0	0
5-Jul	59	9	1	0	4	0	0	31	0	0	0	0	0	0	0
12-Jul	59	8	0	0	4	0	0	36	5	0	0	0	0	0	0
28-Jul	52	11	4	0	6	0	0	39	0	3	0	0	0	0	0
3-Aug	44	9	3	0	4	0	0	37	1	11	3	0	0	0	0
17-Aug	47	7	0	0	4	0	0	40	0	55	15	20	0	0	0
31-Aug	11	1	0	0	4	0	0	19	0	23	4	32	0	0	0
21-Sep	11	1	0	0	6	0	0	25	0	43	8	32	0	0	0
19-Oct	22	4	0	0	4	0	0	24	0	17	6	3	0	0	2

Table 1: 2006 Bird use at the Refinery

	2006 Bird Use at Rowland's Pond										
Date of site visit	Hawaiian Stilt	Stilt Juveniles	Stilt Chicks	Hawaiian Coot	Mallard/X	Duck chicks	Ruddy Turnstone	Sanderling	Pac. Golden Plover	Wandering Tattler	Cattle Egret
19-Jan	0	0	0	0	0	0	0	0	8	0	0
2-Feb	0	0	0	0	0	0	0	0	14	0	0
2-Mar	31	0	0	0	2	0	0	0	1	0	0
10-Mar	59	0	0	0	13	0	0	16	1	0	0
16-Mar	56	0	0	0	7	0	18	48	2	0	0
30-Mar	38	0	0	0	7	0	9	2	3	0	0
6-Apr	41	0	0	2	4	0	11	45	1	0	0
13-Apr	62	0	0	3	12	0	11	30	2	0	0
20-Apr	62	0	0	3	19	0	12	0	0	0	0
27-Apr	56	0	0	0	7	0	8	2	5	1	1
4-May	34	0	3	0	6	0	0	0	0	0	1
11-May	54	0	8	0	9	0	8	0	2	0	0
18-May	44	0	2	0	5	0	49	0	2	0	0
25-May	46	0	3	0	14	0	19	0	0	0	0
1-Jun	35	1	2	0	5	2	0	0	0	0	0
8-Jun	50	2	10	0	14	0	3	0	0	0	0
15-Jun	48	2	4	0	10	0	1	0	1	0	0
20-Jun	47	0	0	0	13	0	0	0	0	0	0
30-Jun	57	4	0	0	14	0	0	0	0	0	0
5-Jul	52	7	1	0	14	0	0	0	0	0	0
12-Jul	48	7	0	0	16	0	0	0	0	0	0
20-Jul	54	6	2	0	24	0	0	0	0	0	0
28-Jul	46	7	2	0	21	0	3	0	0	0	0
3-Aug	40	8	1	0	18	1	11	3	0	0	0
17-Aug	39	5	0	0	17	0	55	15	14	0	0
31-Aug	5	0	0	0	2	0	15	0	20	0	0
21-Sep	0	0	0	0	0	0	0	0	22	0	0
19-Oct	6	0	0	0	4	0	1	3	0	0	0

Table 2: Bird use at Rowland's Pond

2006 Bird Use at the Oxidation Pond Pond

Date of site visit	Hawaiian Stilt	Stilt Juveniles	Stilt Chicks	Hawaiian Coot	Coot Juveniles	Mallard/Mallard hybrid	Sanderling	Pac. Golden Plover
19-Jan	0	0	0	0	0	0	0	0
2-Feb	1	0	0	0	1	0	0	0
2-Mar	1	0	0	1	0	4	1	
10-Mar	7	0	0	0	0	2	0	0
16-Mar	5	0	0	0	0	2	0	0
30-Mar	0	0	0	0	0	2	0	0
6-Apr	2	0	0	0	0	3	0	0
13-Apr	1	0	0	0	0	0	0	0
20-Apr	2	0	0	0	0	0	0	0
27-Apr	2	0	0	0	0	0	0	0
4-May	5	0	0	0	0	1	0	0
11-May	2	0	0	0	0	0	0	0
18-May	2	0	0	0	0	1	0	0
25-May	4	0	0	0	0	0	0	0
1-Jun	6	0	1	0	0	0	0	0
8-Jun	6	0	0	0	0	0	0	0
15-Jun	2	0	0	0	0	0	0	0
20-Jun	3	0	0	0	0	0	0	0
30-Jun	6	0	0	0	0	7	0	0
5-Jul	0	2	0	0	0	2	0	0
12-Jul	2	0	0	0	0	2	0	0
28-Jul	0	0	0	0	0	0	0	0
3-Aug	0	0	0	0	0	0	0	0
17-Aug	5	0	0	0	0	0	0	0
31-Aug	0	0	0	0	0	1	0	1
21-Sep	3	0	0	0	0	3	0	2
19-Oct	5	0	0	0	0	9	0	1
						3	0	0

Table 3: Bird use at the ox ponds.

2006 Bird Use at the Impounding Basin

Date of site visit	Hawaiian Stilt	Stilt Juveniles	Stilt Chicks	Hawaiian Coot	Coot Juveniles	Mallard/Mallard hybrid	Duck chicks	Ruddy Turnstone	Sanderling	Pac. Golden Plover	Wandering Tattler	Northern Shoveler
19-Jan	35	8	0	4	1	21	0	29	19	5	0	0
2-Feb	35	0	0	5	0	15	0	28	12	3	2	10
2-Mar	12	0	0	6	0	13	0	1	5	1	0	9
10-Mar	4	0	0	6	0	2	0	5	17	5	0	9
16-Mar	8	0	0	6	0	3	0	1	1	1	0	8
30-Mar	13	0	0	6	0	1	0	3	2	1	0	10
6-Apr	5	0	0	3	0	1	0	10	3	18	0	4
13-Apr	5	0	0	1	0	2	0	47	1	0	0	0
20-Apr	9	0	0	3	0	2	0	18	0	1	0	0
27-Apr	15	0	0	4	0	7	3	5	0	0	0	0
4-May	16	0	0	5	0	8	0	5	0	0	0	0
11-May	16	0	0	4	0	7	3	0	0	0	0	0
18-May	8	0	0	3	0	8	3	0	0	0	0	0
25-May	14	0	0	3	0	10	3	0	0	0	0	0
1-Jun	8	0	0	5	0	14	1	0	0	0	0	0
8-Jun	15	0	0	5	0	19	2	0	0	0	0	0
15-Jun	6	0	0	5	0	24	2	0	0	0	0	0
20-Jun	10	0	1	6	0	27	0	0	0	0	0	0
30-Jun	8	3	0	2	0	21	0	0	0	0	0	0
5-Jul	7	0	0	4	0	15	0	0	0	0	0	0
12-Jul	9	1	0	4	0	20	5	0	0	0	0	0
28-Jul	6	4	2	6	0	18	0	0	0	0	0	0
3-Aug	4	1	2	4	0	19	0	0	0	0	0	0
17-Aug	3	2	0	4	0	18	0	0	0	0	0	0
31-Aug	6	1	0	4	0	14	0	8	4	8	0	0
21-Sep	8	1	0	6	0	14	0	43	8	4	0	0
19-Oct	11	4	0	4	0	15	0	12	3	2	0	2

Table 4: Bird use at the impounding basin

2006 Bird Use at other areas

Date of site visit	Hawaiian Stilt	Hawaiian Coot	Mallard/Mallard hybrid	Ruddy Turnstone	Sanderling	Pac. Golden Plover	Wandering Tattler	Cattle Egret	Northern Shoveler
19-Jan	0	0	0	0	0	0	0	0	0
2-Feb	15	0	3	2	1	2	0	0	0
2-Mar	0	0	0	0	0	0	0	0	0
10-Mar	0	0	0	0	0	0	0	0	0
16-Mar	11	0	0	13	38	2	0	0	0
30-Mar	5	0	0	5	3	1	0	0	0
6-Apr	3	0	1	1	0	0	0	0	0
13-Apr	2	0	0	9	0	1	0	0	0
20-Apr	2	0	0	1	0	2	0	0	0
27-Apr	0	0	2	1	0	1	0	0	0
4-May	0	0	0	0	0	0	0	0	0
11-May	0	0	0	0	0	0	0	0	0
18-May	0	0	0	0	0	0	0	0	0
25-May	0	0	0	0	0	0	0	0	0
1-Jun	0	0	0	0	0	0	0	0	0
8-Jun	0	0	0	0	0	0	0	0	0
15-Jun	0	0	0	0	0	0	0	0	0
20-Jun	0	0	0	0	0	0	0	0	0
30-Jun	0	0	0	0	0	0	0	0	0
5-Jul	0	0	0	0	0	0	0	0	0
12-Jul	0	0	0	0	0	0	0	0	0
28-Jul	0	0	0	0	0	0	0	0	0
3-Aug	0	0	0	0	0	0	0	0	0
17-Aug	0	0	4	0	0	2	0	0	0
31-Aug	0	0	0	0	0	2	0	0	0
21-Sep	0	0	2	0	0	5	0	0	0
19-Oct	0	0	2	4	0	1	0	0	0

Table 5: Bird use at areas other than Rowland's Pond, oxidation ponds, and impounding basin at the Chevron refinery.

Appendix C: Plant list

Hawaiian/Common Name	Scientific Name
Sow thistle	*Sonchus oleraceus*
Koa Haole	*Leuceana leucocephala*
Keawe	*Prosopis pallida*
Love in a mist	*Passiflora foetida*
	Sporobolus pyramidatus
Akulikuli *	*Sesuvium portulacastrum*
Asiatic Pennywort	*Centella asiatica*
Australian Saltbush	*Atriplex semibaccata*
Bermuda Grass	*Cynodon dactylon*
Buffalo Grass	*Stenotaphrum secundatum*
Common Yellow Asteraceae	*Flaveria trinervia*
Garden Spurge	*Chamaesyce hirta*
Golden Crownbeard	*Verbesina encelioides*
Indian Fleabane	*Pluchea indica*
Kaluha/Bulrush *	*Bolboschoenus maritimus*
Kipukai/Seaside Heliotrope *	*Heliotropium curassavicum*
Little Bell	*Ipomoea sp. (triloba?)*
Sour Bush	*Pluchea carolinensis*
Sprangletop Grass	*Leptochloa uninervia*
Swollen Fingergrass	*Chloris barbata*

* Indigenous species

Table 1: 2006 Rowland's Pond plant list

Appendix D: IIMS Reports

IIMS Report No.: 2006-Chev-1
Map: None
Photos: None.
Diagnostic Case Report No.: Pending necropsy.

Incident: Collection of deceased Hawaiian Stilt
Date of Incident: May 26, 2006
Authors of Report: John Andrews, HFS/PSM Specialist, Chevron Hawai`i Refinery (Chevron)
Date Report Completed: June 1, 2006
Location: Under net, square pond (dry) adjacent to Rowlands Pond
Species: Hawaiian Stilt (*species*)
Observation Site: Under net, square pond (dry) adjacent to Rowlands Pond
Observers: APB force account contractors
Item Collected: 1 deceased Hawaiian Stilt
Collector: Stephen Neill

Incident: On May 26, 2006, at approximately 13:30 hours, APB contractors retrieved a deceased stilt found on the ground from under the netted area of the dry square pond adjacent to Rowlands Pond. No trauma was apparent, no predator signs, and no oil contamination of the carcass. Decomposition odors were present. Based on prior observations of the area, the bird may have been deceased for less than 18 hours when recovered. The bird was placed in a plastic bag, and turned over to Helen Mary Wessel of the Chevron environmental group. Wessel wrapped the carcass in aluminum foil, and placed it in a refrigerator in the refinery Laboratory. On June 1, 2006, John Andrews of the Chevron environmental group turned over the carcass to wildlife biologist Christine Volinski. The carcass will be transported to USF&W at the earliest possible convenience.

Location Description: The Hawaiian Stilt was collected from under the netted area of the square pond adjacent to Rowlands Pond. The square pond surface area was dry, with small patches of mud flats created by rainfall which had occurred earlier in the season.

Background: None.

Carcass photos taken

IIMS Report No.: 2006-Chev-2
Map: None
Photos: None.
Diagnostic Case Report No.: Pending necropsy.

Incident: Collection of deceased Hawaiian Stilts (4)
Date of Incident: June 1, 2006
Authors of Report: John Andrews, HFS/PSM Specialist, Chevron Hawai`i Refinery (Chevron)
Date Report Completed: June 1, 2006
Location: Under net, square pond (dry) adjacent to Rowlands Pond
Species: Hawaiian Stilt (*species*)
Observation Site: Under net, square pond (dry) adjacent to Rowlands Pond

2006 Hawaiian Stilt and Hawaiian Coot Monitoring. Chevron Hawaii Refinery

Observers: APB force account contractors
Item Collected: 3 deceased Hawaiian Stilts
Collector: Christine Volinski

Incident: On June 1, 2006, at approximately 1515 hours, while performing weekly waterfowl monitoring, biologist Christine Volinski discovered 4 dead stilts found on the ground and the berm area under the net of the dry square pond adjacent to Rowlands Pond. No trauma was apparent, no predator signs, and no oil contamination of the carcasses. Three of the stilts, chicks, were found in the basin area. One adult was discovered wedged under the net between the net and the berm. Decomposition and insect predation were present in all four carcasses. At approximately 1545, Volinski and John Andrews retrieved the carcasses, wrapped them in plastic bags and aluminum foil, and placed the carcasses in a refrigerator. The carcasses will be transported to USF&W at the earliest convenience.

Location Description: The Hawaiian Stilts were collected from under the netted area of the square pond adjacent to Rowlands Pond. The square pond surface area was dry, with small patches of mud flats created by rainfall which had occurred earlier in the season.

Background: None.

Carcass photos taken

IIMS Report No.: 2006-Chev-3
Map: None
Photos: None.
Diagnostic Case Report No.: Pending necropsy.

Incident: Collection of deceased Hawaiian Stilt
Date of Incident: August 7, 2006
Authors of Report: John Andrews, HFS Specialist, Chevron Hawai`i Refinery (Chevron)
Date Report Completed: August 7, 2006
Location: On berm, southwest corner of Oxidation Pond 3
Species: Hawaiian Stilt (*species*)
Observation Site: On berm, southwest corner of Oxidation Pond 3
Observers: Chevron Effluent Plant operator
Item Collected: 1 deceased Hawaiian Stilt
Collector: John Andrews

Incident: On August 7, 2006, at approximately 0355 hours, while performing routine rounds, a Chevron operator discovered 1 dead stilt on the berm area at the southwest corner of Oxidation Pond 3 at the Refinery's Effluent Plant. No trauma was apparent, no predator signs, and no oil contamination of the carcass. Decomposition and insect predation were present in the carcass. At approximately 0745, John Andrews retrieved the carcass, wrapped it in aluminum foil and a plastic bag, and placed the carcass in a refrigerator. The carcass will be transported to USF&W at the earliest convenience.

Location Description: The Hawaiian Stilt was collected from the berm area at the southwest corner of Oxidation Pond 3. The area was dry rocky coral sand, just off the access road.

Background: None.

IIMS Report No.: 2006-Chev-4
Map: None
Photos: None.
Diagnostic Case Report No.: Pending necropsy.

Incident: Collection of deceased Hawaiian Stilt
Date of Incident: September 20, 2006
Authors of Report: John Andrews, HFS Specialist, Chevron Hawai`i Refinery (Chevron)
Date Report Completed: September 20, 2006
Location: Next to fence, across from south west corner of Impound Basin
Species: Hawaiian Stilt (*species*)
Observation Site: Next to fence, across from south west corner of Impound Basin
Observers: Chevron Effluent Plant operator
Item Collected: 1 deceased Hawaiian Stilt
Collector: John Andrews

Incident: On September 20, 2006, at approximately 0425 hours, while performing routine rounds, a Chevron operator discovered 1 dead stilt next to the perimeter fence, across from the south west corner of Impound Basin at the Refinery's Effluent Plant. The adult bird's neck was broken, with the head nearly severed. There were no signs of predator consumption, and no signs of insect predation.

At approximately 0530, John Andrews retrieved the carcass, wrapped it in aluminum foil, and placed the carcass in a refrigerator. The carcass will be transported to USF&W at the earliest convenience.

Location Description: The Hawaiian Stilt was collected from an area next to the perimeter fence, across from the south west corner of Impound Basin at the Refinery's Effluent Plant. The area is dry rocky coral sand, just off the access road.

Background: None.

Photos attached

Appendix E: Location and map of Chevron Hawaii Refinery

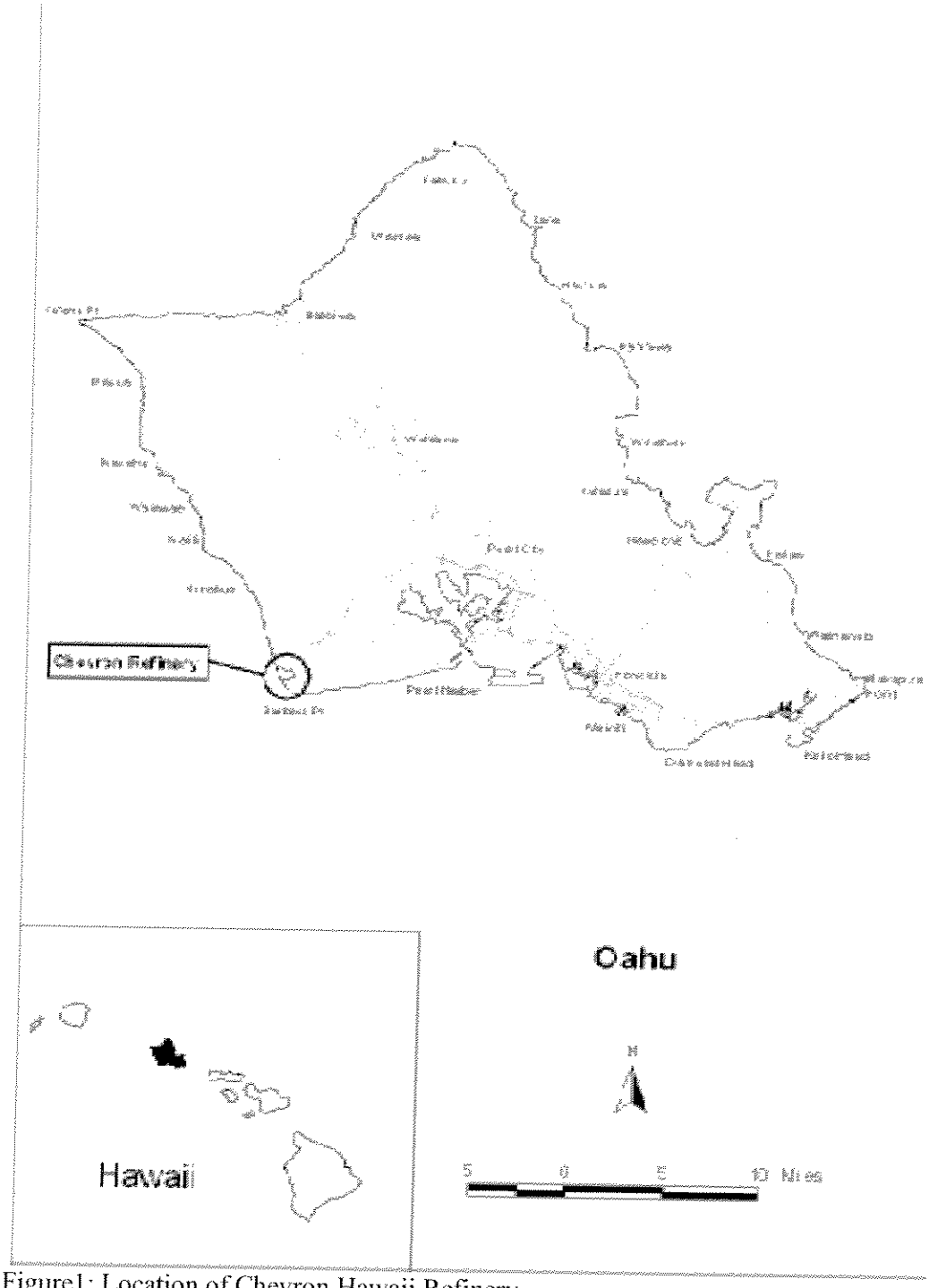

Figure1: Location of Chevron Hawaii Refinery

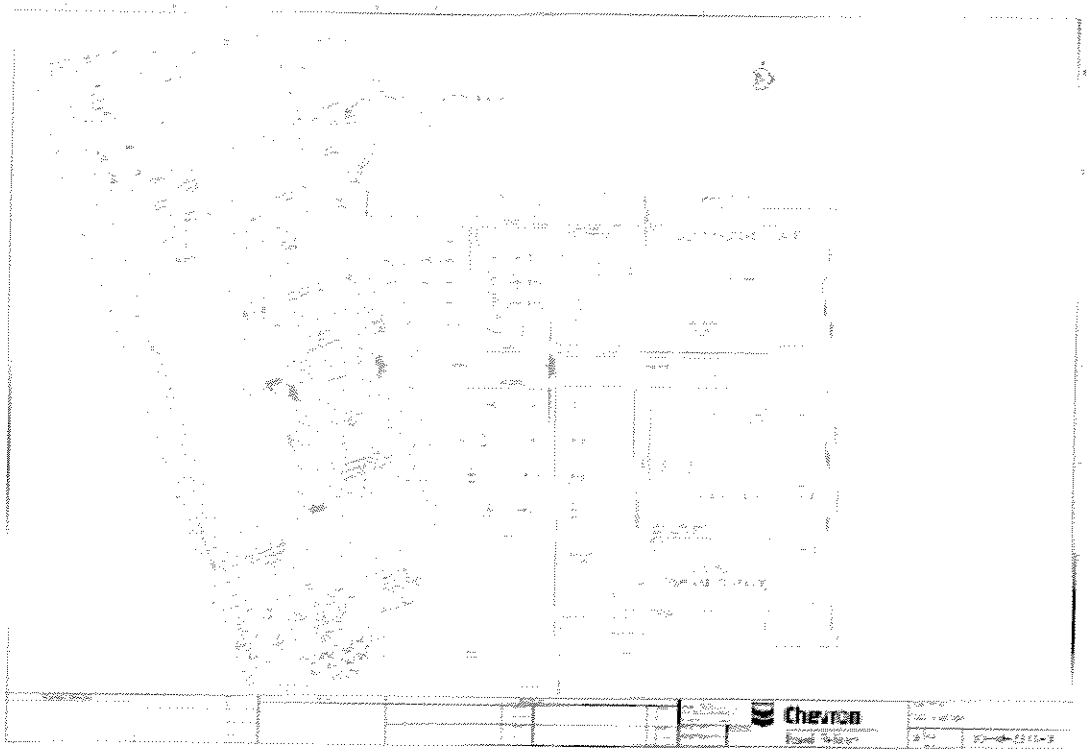

Figure 2: Map of Chevron Hawaii Refinery.